

# Continuous Cost-Risk Management

A System of Cost Systems linked together in sequence by the same risks

Incorporated in  
NPR 7120.5C

**Stage 3**  
**Application**  
Cost-Risk  
Feedback:  
Steps 9-12



In order to meet the space project cost challenges for the next decade and beyond, NASA cost management processes must evolve from traditional methods to modes that are truly transformational. The new focus for cost management at NASA will be Continuous Cost-Risk Management (CCRM). Additionally, the days of implementing cost management as a set of "stovepipe" activities are over. In reality, cost management is a series of related cost activities and involves three main Stages that are linked together through a shared set of project risks. Cost management, in effect, IS the management of cost-risk and can be characterized as continuous feedback on cost-risk. Feedback is essential to the transformation of cost management into a dynamic, continually reacting system where focused reporting of metrics on medium and high-risk drivers alert the project manager that a negative cost trend has been identified and requires action. The three Stages of Continuous Cost-Risk Management: *Preparing* for cost-risk feedback; *Developing* cost-risk feedback; and, *Applying* cost-risk feedback, occur at different points in time during an acquisition phase and involve the collaboration among cost estimators, project engineers, project managers, procurement analysts and Earned Value Management (EVM) specialists in managing the challenges presented by the risks. Cost management is NOT a grouping of unrelated stove-piped cost activities but is a "system of cost systems" based on viewing 12 cost activities normally treated as stovepipes as a continuum of activities interconnected through risk. This CCRM repeats in most acquisition phases.

The first Stage in Continuous Cost-Risk Management, *Preparing* for cost-risk feedback, involves NASA project teams performing three main activities: cost/performance trades (e.g., Cost as an Independent Variable (CAIV)); developing a definition of the program (e.g., part of the Cost Analysis Data Requirements (CADRe)) and, producing a range of possible costs (e.g., probability density function (PDF) and cumulative distribution function (CDF) or “S”-curve). CAIV trades flow out of a well-defined Concept of Operations (CONOPS) and demonstrate a commitment to evolutionary acquisition by being initiated in pre-Phase A for earliest implementation. These cost/performance trades are the first opportunity for representing the potential cost impacts due to risk. The CADRe will contain the definition of the project (analogous to the DoD Cost Analysis Requirements Description or CARD) for use by cost estimators where the traceability from Work Breakdown Structure (WBS) element, through functions, to initial requirements will be clearly identifiable. The cost range exemplified in a PDF and CDF involves developing a reference point cost estimate from a cost model (e.g., NAFCOM, PRICE, SEER, etc.), and incorporating cost model estimation, technical and correlation risk. Participants in the *Preparing* for cost-risk feedback Stage of the CCRM are mainly cost estimators, project engineers and project managers. This represents the starting point for cost-risk management. From this point forward the challenge will be in managing to the cost level chosen, no matter what cost-risk margin has been included.

The second Stage in Continuous Cost-Risk Management is *Developing* the feedback to manage the cost-risks. Since hardware contractors are selected to develop NASA systems, they must be informed about the potential cost-risk impacts identified by the NASA cost teams for their attention, monitoring, management, and reporting to the NASA project office. They must be informed in the Request for Proposal (RFP) Data Requests (DR) to produce multiple products that reflect the status and trends of these potential cost-risks. For example, as part of the CADRe, they will be required to produce a Life Cycle Cost Estimate (LCCE) for the proposal and LCCE updates at significant contract milestones (at least annually) as part of the contractual effort. The “S”-curve products of these requirements will enable the measurement of variance changes in the cost-risk distribution over time reflecting the management of risk and cost-risk. The CADRe will also require that initial key technical parameters, and changes to them over time, be documented along with actual costs associated with all WBS elements. These data will eventually populate the One NASA Cost Engineering (ONCE) database, keeping a record of project cost behavior for updating NASA cost models and available for cost analysis. Requirements to monitor, manage, and report monthly on the top medium and high-risk WBS elements identified during the *Preparing* Stage will be included. When required, a monthly earned value report will also be in the RFP, requiring performance measurement, variance analysis and corrective action reporting on all WBS elements, with a special focus on medium and high-risk WBS elements. These reports will require monthly Estimates at Completion (EAC) on all elements with a special focus on medium and high-risk WBS elements. Electronic access to these data will also be required. Other sources for monitoring and managing the top medium and high-risk WBS elements can come from Technical Performance Measure (TPM), Risk Management, Technical Interchange Meeting (TIM), Integrated Product Team (IPT) and

Probability Risk Assessment reports. Based in part on the way bidders address these RFP requirements in the cost proposals submitted, NASA will select a winning bidder and set up a post-award meeting with the selected contractor to verify the proposed cost-risk management methods. If EVM is required on the effort, the meeting at which this discussion takes place (along with baseline validation) is called an Integrated Baseline Review (IBR). Participants in *Developing* cost-risk feedback are the cost estimators, project engineers, project managers, procurement analysts and EVM specialists.

The third Stage in cost-risk management is *Applying* the cost-risk feedback for managing costs. If the first two Stages in cost-risk management, *Preparing* for cost-risk feedback and *Developing* cost-risk feedback, have been properly accomplished, the cost-risk feedback from the EVM (or similar) system, supported by TPM reports, Risk Management Reports, TIM minutes, IPT meeting minutes, etc., will give the project manager the highest quality information possible for managing those WBS elements most likely to drive cost growth. The focus for reporting, analysis and action will be on medium and high-risk WBS elements since they were identified for specific reporting in the RFP and addressed by the winning contractor in his proposal. If cost and schedule performance analysis indicates problems, a decision to reiterate a cost/performance trade (part of the *Preparing* for cost-risk feedback Stage above) may have to be made, for a possible adjustment to a system requirement. EVM performance analysis, focused on risk impacts to cost and schedule, will enable development of monthly EACs providing the project manager crucial feedback on the potential cost effects of the risks. This information provides the project manager with focused insight into the cost-risk in order to better manage his/her costs. CADRe-required updates to the initial LCCE estimate at significant milestones (at least annually) can be analyzed for changes (hopefully reductions) in “S”-curve variances, indicating progress in managing risks and cost-risks. At the end of the effort a volume of high-quality cost, risk, and cost-risk information will have been collected that can be added to the ONCE database for follow-on contractor performance analysis, cost-risk methodology calibration and updating cost models in order to better cost estimate future projects. Participants in *Applying* cost-risk feedback are primarily project engineers, project managers and EVM specialists with cost estimator involvement during cost/performance trades (if required), and updating “S”-curves, databases and cost models.